

D.T.E. 01-67

Investigation by the Department of Telecommunications and Energy on its Own Motion into the Service Quality of Fitchburg Gas and Electric Light Company

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FOR: FITCHBURG GAS AND ELECTRIC LIGHT
COMPANY
Respondent

I. INTRODUCTION

On August 24, 2001, the Department opened an investigation into the service quality of Fitchburg Gas and Electric Light Company (“Fitchburg” or “Company”) (“Notice Opening Investigation”). The Department stated that the focus of this investigation would be Fitchburg’s management of its electric distribution system. The Department specifically directed Fitchburg to provide information in the following areas: growth forecasting; communication and notification procedures during outages; use of emergency generators and other equipment; personnel staffing and deployment during outages;¹ weather forecasting; and maintenance and design of its distribution system. The Department docketed this proceeding as D.T.E. 01-67.

On October 29, 2001, Fitchburg filed a report assessing its distribution system’s reliability (“Report”). The Department held public hearings within Fitchburg’s service territory in Lunenburg, Massachusetts as well as at our offices in Boston, Massachusetts. At these hearings, the Department took comments on the Report from elected public officials, representatives of the Commonwealth agencies, and members of the public.²

¹ By letter dated September 12, 2001, the Department requested the following additional information regarding personnel: (1) adequacy of staffing levels for operation and maintenance of the distribution system, including inspection staffing levels; (2) identification and description of all training programs for employees engaged in electric service operation and restoration efforts; and (3) a cost/benefit assessment of establishing a program of periodic (i.e., over a specified cycle of years) inspection of both above-ground and underground distribution plant to be conducted by personnel who are expressly dedicated to inspection.

² The public hearings shall be identified chronologically by date (i.e., Tr. 2 shall refer to the public hearing at

II. FITCHBURG'S REPORT

A. Introduction

Fitchburg's Report includes a review of the areas of inquiry raised by the Department as well as a description of the measures that Fitchburg is implementing, or plans to implement, to improve system reliability. This Order assesses Fitchburg's management of its distribution system by reviewing the Company's performance in the areas of which the Department inquired. In making this assessment, the Department exercises its supervisory authority pursuant to G.L. c. 164, § 76 without managing the daily activities of the Company. See New England Telephone and Telegraph Co. v. Department of Public Utilities, 360 Mass. 443, 466-468, 483-484, 489 (1971) (interference with exercise of judgment by company business management is beyond Department's regulatory power and authority). Finally, the Order summarizes the recommendations and reporting requirements made throughout this Order.

B. Growth Forecasting

1. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the adequacy of Fitchburg's growth or load forecasting at the community, business district, or

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neighborhood level. The Department also solicited comments regarding improvements that could be made to Fitchburg's load forecasting process. Fitchburg responds that it performs load forecasting at two levels through services rendered by its affiliate Unitil Service Corporation ("Unitil"): (1) transmission and subtransmission planning, primarily 69 kilovolts ("kV") or more; and, (2) distribution planning, primarily 13.8 kV or less (Report at 10). In the past, Fitchburg has used a linear regression analysis to forecast future peak loads from historic (actual) peak load data (id.).³ Fitchburg asserts this forecasting process has produced consistent results that over time have proven to track with actual annual electric demands (id. at 10-11). Fitchburg states that it is not cost-effective to invest in transmission system infrastructures to meet abnormal peak conditions and withstand contingencies at the same time (id. at 18).

Nonetheless, Fitchburg has re-examined its forecasting methodology of its transmission system and has decided improvements could be made (id. at 16). Fitchburg states that it will now use a third order polynomial form fitting approach for trending of peak load data rather than a linear regression analysis (id.). Fitchburg states that it plans to predict the maximum possible peak demand using this methodology. Fitchburg explains that this approach is expected to require as many as three standard deviations to capture all data points (id. at 17). With respect to distribution system planning, Fitchburg notes that it continues to use a linear regression analysis for each circuit and feeder (id. at 19).

³ Fitchburg bases peak load forecasts on linear regression analysis, plus on standard deviation (Report at 11).

2. Analysis and Findings

The Department has long reviewed utility load forecasts. In the past, we have reviewed load forecasts with a view toward generation adequacy. See 220 C.M.R. §§ 10.00 et seq. In this review, however, the Department's analysis focuses on the Company's use of load forecasts in the operation of the distribution system. See Order Commencing a Notice of Inquiry into (1) rescinding 220 C.M.R. §§ 10.00 et seq. and (2) exempting electric companies from any or all of the provisions of G.L. c. 164, § 69I, D.T.E. 98-84/EFSB 98-5 (1998).

Load forecasting is a very important component of transmission and distribution ("T&D") facilities' expansion or upgrade planning. Accurate load forecasts allow planning engineers to simulate the behavior of transmission lines, distribution lines, and the equipment in between them. Accurate load forecasts, together with the correctly-modeled, planning databases in the distribution analysis software, allow engineers and management to envision future problems likely to happen through distribution system simulation during normal operating conditions and also during emergency conditions. Results of these simulations allow management to allocate necessary resources properly. Under-forecasts could stress the system beyond its capability and jeopardize the ability to serve customer load, and would make the distribution system more susceptible to frequent breakdowns at various locations. Over-forecasts could result in excessive capital and human resources need estimates, ultimately leading to an over-built system needlessly costly to ratepayers.

The steps that Fitchburg has made in its forecasting process may enhance long-range forecasting and distribution facilities planning. Nonetheless, Fitchburg's forecasting process omits certain features that may enhance its forecasting ability, which we will discuss below.

First, Fitchburg has stated that it does not intend to use extreme weather forecasts for planning distribution facilities during both normal and emergency conditions. As seen this past summer, customers demand for electricity increases considerably during extreme weather conditions. If the existing T&D system is examined for its normal operation (without outages) during an extreme weather condition, it would provide information about equipment capability during times of higher peak demands and extreme weather. If the T&D system is examined for emergency operation (with outages) during an extreme weather condition, it would uncover and identify any and all weaknesses in the system and customer outages would be minimized. Therefore, Fitchburg should consider the use of extreme weather condition forecasts with outages or contingencies simulated in the power flow model for planning and designing T&D facilities.

Second, Fitchburg has not addressed the potential of demand-side management ("DSM") measures to reduce load in its forecasts. DSM programs, such as the use of efficient equipment in homes, reduce energy consumption overall in the system. Together with energy efficiency and load-shifting applications, DSM programs can reduce overall peak demand. Therefore, the effect of DSM programs needs to be incorporated in Fitchburg's load forecasting process.

Third, Fitchburg has not addressed the effect of peak load shaving or load shedding implemented by certain customers (industrial or commercial). During the inevitable times of peak load, there are customers who are willing to reduce their load. By reducing their load, peak demands can be reduced, which will reduce the stress on the distribution system. Therefore, the effect of peak load shaving or load shedding needs to be incorporated in load forecasting.

Fourth, Fitchburg has not addressed the effect of T&D system losses on the peak demand forecasts. T&D system losses are an integral part of a total system load that need to be considered in serving customer load. By using more efficient equipment, such as transformers, large wires and capacitors, the magnitude of peak load demand required at the system level could be reduced. Therefore, Fitchburg needs to address the use of more efficient transformers and wires in its load forecasting process.

Based on the foregoing, the Department finds that while the steps Fitchburg has undertaken may improve its load forecasting ability, there are further steps that Fitchburg should take. Therefore, the Department directs Fitchburg to consider including the following in its load forecasting process and to report back by June 1, 2002 on the value and feasibility of these measures:

1. The means, including probability levels, by which extreme weather can be included in forecasts for both normal and emergency conditions;
2. The effect of equipment efficiency programs (DSM programs) on reducing peak load forecasts;
3. The effect of peak load shaving or load shedding applications/incentives on reducing peak load demand forecasts; and
4. The effect of T&D system losses, and measures to reduce them, on system-wide peak demand forecasts.

The Department also directs Fitchburg to submit annually ten-year peak demand load forecasts for both summer and winter. The forecasts should also include, but not limited to, all of the factors discussed above.

C. Communications and Notifications Procedures

1. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the appropriateness of Fitchburg's communications and notifications procedures. In particular, the Department sought information regarding procedures during outage and storm recovery, both internal to the Company and between the Company and the following entities: municipalities, affected neighborhoods, political leaders, and regulators. The Department made specific inquiry into Fitchburg's use of accurate and real-time updates.

Fitchburg responds that it has two levels of procedures for internal and external communication purposes (Report at 27). During routine outage events (including minor storms), public notifications and updates are prepared and issued by local Fitchburg personnel (id.). A formal communication process is established any time a significant event triggers Fitchburg's Emergency Information Program ("EIP") (id. at 27).⁴

Fitchburg also states that, effective September 1, 2001 and pursuant to a new Outage Reporting Protocol ("ORP"), it provides updates to the Department and local municipalities

⁴ The EIP enables Fitchburg to provide management, and external parties when appropriate, necessary and pertinent information related to both system emergencies and associated restoration efforts.

regarding outage information (id. at 28). Additional information, not covered by the ORP, is provided to customers, the media and public officials upon request or at periodic intervals (id.).

2. Analysis and Findings

Fitchburg avails itself of reasonable communication and notification procedures. These procedures include its EIP and complying with the Department's ORP, which requires regular updating of lists of key contacts at both the municipal and the Department level. Fitchburg, however, has not addressed the following: (1) the relationship between the EIP and the ORP, if any; and, (2) how Fitchburg will regularly update its key contact lists consistent with the EIP and as required by the ORP. Therefore, the Department directs Fitchburg to provide the following by June 1, 2002:

1. An explanation of the relationship between the EIP and the ORP, if any; and
2. The method and regularity by which its key contact list will be updated, consistent with the EIP and as required by ORP requirements.

D. Use of Emergency Generators and Other Equipment

1. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the adequacy of Fitchburg's deployment of emergency generators and supply of equipment to restore critical service or ease prolonged interruptions. Fitchburg responds that it makes available a list of contractors that rent and install generating units, particularly for use in unanticipated or emergency conditions (id. at 35). Fitchburg also states that it has an inventory of spare equipment and parts for overhead and underground T&D facilities, including two mobile substations ready for service in the event of a transformer failure at one of its

distribution substations (id. at 45). Further, Fitchburg states that it has ready access to other utilities' resources and equipment in emergencies (id. at 27, 32).

2. Analysis and Findings

It is reasonable for Fitchburg to balance the feasibility of restoring critical loads using temporary means with the time it will take to permanently restore power. Fitchburg, however, fails to assess the need for the availability of emergency generators where the loss of supply to a particular area should be remedied by installing mobile generators, because the repair of the failed equipment would take an extended period of time. Performing a contingency analysis consistent with the Department's directives would help identify this need. Therefore, the Department directs Fitchburg to report back by June 1, 2002 regarding the following:

1. Performing a contingency analysis consistent with the Department's directive identifying the need, if any, of the emergency generators;
2. Developing deployment procedures for the use of emergency generation as identified by its analysis, or where circuit repairs would take an extended period of time; and
3. Conducting a survey of Fitchburg's large institutional customers, including hospitals, schools, and municipal buildings, to assess whether these customers have adequately sized their own back-up generation and have in place proper deployment procedures.

E. Personnel Staffing and Deployment

1. Personnel Availability

a. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the soundness of personnel availability and work crew call-up and deployment procedures.

Fitchburg responds that its customer service center provides round-the-clock service to customers, and is able to increase staffing to meet the increased call demand associated with

major outage events (id. at 31). Fitchburg's dispatch center also provides round-the-clock coverage and is able to increase staffing or call in supervisory personnel to coordinate the response of field crews during system emergencies (id.). During major events and system emergencies, Fitchburg may be required to deploy all of its crews and seek additional outside resources (id.). Fitchburg also obtains assistance from external contractors and other utilities (id. at 32).

b. Analysis and Findings

During the Summer of 2001, Fitchburg was able to restore power within a few hours to the limited number of customers who had outages. This ability indicates that it has adequate staff available to provide reliable distribution service to customers. However, consistent with the Department's directives on the use of emergency generation, Fitchburg also should be prepared to deploy the generation equipment as necessary.

2. Weather Forecasting

a. Fitchburg

In its Notice Opening Investigation, the Department also sought information regarding Fitchburg's weather forecasting. Fitchburg responds that it subscribes to a national weather forecasting service that provides information about approaching weather conditions (Report at 31). If weather conditions are forecasted that could cause widespread damage or power outages, a pre-storm planning meeting is conducted with operations personnel (id.). The EIP also may be activated should the threat of severe weather warrant full mobilization of the

Company's resources (id.). This includes deployment of all its crews, for which Fitchburg outlines its procedures (id. at 31-32).

b. Analysis and Findings

Fitchburg avails itself of a reasonable avenue of weather forecasting and operates in accordance with the normal operating practices of the industry. The Company, however, does not detail the nexus between forecast reports of extreme weather and adequate staffing of line crews, the dispatch center, and the customer service center. The Department directs Fitchburg to provide a quarterly report for the next two years beginning June 1, 2002, regarding staff availability, the use of affiliate staff, external contractors or mutual assistance.

3. Employee Staffing Levels

a. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the adequacy of employee staffing levels for operation and maintenance of the distribution system, including inspection staffing levels. Fitchburg responds that it employs a workforce appropriate to the size of its service territory and customer base, with 85 operations employees capable of assisting in service restoration (Report at 32). As support for this conclusion, Fitchburg states that during the summer of 2001, Fitchburg's customers experienced limited outages (id. at 33). When outages did occur, electricity was restored to most customers within a few hours (id.). During the infrequent occasions when its internal resources are not sufficient, Fitchburg states that it has been successful meeting its staffing requirement by obtaining the services of crews

from other Unitil affiliates, employing the services of outside contractors, or engaging its own supervisory personnel to restore service (id. at 32).

b. Analysis and Findings

The adequacy of properly trained staff to maintain good service and to restore service in a timely way after an outage is a matter of great importance. Fitchburg's experience during the Summer of 2001 indicates that it has adequate operation crews during holiday or outage situations. However, Fitchburg has not considered the adequacy of staffing in load forecasting and distribution planning departments consistent with the Department's directives. Therefore, the Department directs Fitchburg to address the adequacy of staffing levels needed in the forecasting and distribution planning departments by June 1, 2002.

4. Training Programs for Employees

a. Fitchburg

In its Notice Opening Investigation, the Department requested identification of all training programs for employees engaged in electric service operation and restoration efforts. Fitchburg responds that it invests significantly in the development of all its operations employees thorough internal training programs and external classes and training seminars (Report at 33). For example, all employees engaged in electric service operation and restoration efforts receive training related to the performance of their assigned duties during a restoration effort (id.). For field workers, this training includes safety instruction, downed wire identification, and damage assessment (id. at 33-34).

b. Analysis and Findings

Fitchburg's training programs for employees engaged in electric service operation and restoration are acceptable. The Department, however, directs Fitchburg to report also on the training of new employees that may be hired in response to our directives in this Order, not only in electric service operation and restoration but in all activities related to customer outages, such as the dispatch and customer call centers.

5. Inspection of Above-Ground and Underground Distribution Plant

a. Fitchburg

In its Notice Opening Investigation, the Department requested a cost-benefit assessment of establishing a program of periodic inspection of both above-ground and underground distribution, to be conducted by personnel who are expressly dedicated to inspection. Fitchburg responds that, because of its size, it has used its own trained personnel to conduct most testing, inspection, and maintenance work on the system (Report at 43). Where Fitchburg has deemed it necessary to hire outside contractors to perform inspection or testing functions, such work has been limited to activities requiring specific expertise and specialized equipment (id.).

Regarding the Department's request for a cost/benefit analysis, Fitchburg concludes that dedication of staff solely for inspection activities is unnecessary to ensure the reliability of its system (id. at 44). Fitchburg reasons that: (1) it has a policy of implementing corrections for maintenance in a timely manner, which includes regular inspections; (2) it completes a full cycle of scheduled maintenance and inspection annually; and (3) all work required to correct deficiencies found during these inspections is scheduled and completed on a priority basis (id.).

b. Analysis and Findings

Fitchburg has employees whose work includes distribution line and system inspections. These employees have information regarding the condition and performance of the distribution system components and infrastructures that the T&D planning engineers need for their analysis of infrastructure improvement and system upgrade recommendations. Therefore, the Department directs Fitchburg to consider having dedicated staff available to provide this information to the distribution planning and system planning areas and to report back on the value and feasibility of doing so by June 1, 2002.

F. Maintenance and Design

1. Overall Maintenance Practices and Spares Inventory

a. Fitchburg

In its Notice Opening Investigation, the Department requested information regarding the adequacy of overall and particular community maintenance practices and of equipment and spares inventory to meet outage restoration demands. Fitchburg responds by providing its maintenance policy and stating that it has extensive maintenance practices (Report at 44). Fitchburg also states that it has a vegetation management program to provide for distribution system reliability as well as to promote aesthetics and the environment of the community it serves (id. at 45). Fitchburg explains that it manages an inventory and database of spare equipment and spare parts for its in-service facilities (id.). Fitchburg also states that it stores an inventory of critical materials used in overhead and underground line construction as emergency stock (id.). Fitchburg states it is preparing a specific policy covering management its inventory

of critical spare parts for implementation by year-end (id. at 47). b.

Analysis and Findings

While the Company states that it has both a maintenance policy and a vegetation management program, Fitchburg has not provided a schedule for inspections of its distribution system or tree trimming. Therefore, the Department directs Fitchburg to provide quarterly commencing June 1, 2002, a schedule detailing tree trimming activities on a circuit basis, including documentation of cooperation with local communities, and inspections of distribution facilities. The Department also directs Fitchburg to provide its policy covering inventory of spare parts.

2. Distribution Design

a. Fitchburg

In its Notice Opening Investigation, the Department requested the identification of distribution design flaws that led to repeated outages on particular circuits, especially circuits that serve critical community facilities. Fitchburg responds that its distribution system has no known design flaws (id. at 47). Fitchburg notes, however, that while the overall level of system performance may meet desired or accepted performance standards, not all areas within the system will achieve the same level of performance (id.). As part of its efforts to manage these pockets on an on-going basis, Fitchburg has implemented programs to monitor and analyze reliability, to evaluate poorly performing circuits, and to recommend and budget projects or other operating solutions to address reliability concerns (id. at 48). These programs include the

following: Reliability Reporting and Tracking; Identification of Poorly Performing Circuits; and Prioritization of Reliability Improvement Projects.

b. Analysis and Findings

While Fitchburg provided a general description of its distribution design and programs to maintain its reliability, it did not include Fitchburg's distribution design and planning guide, an operating study report showing power flows and voltages for normal and emergency conditions, and a listing of critical loads by town. Also, to apply proper application of planning studies, Fitchburg should have three-phase loadflow software to analyze and test contingencies at extreme weather conditions. Therefore, the Department directs Fitchburg to provide the following:

1. A complete planning criteria and distribution design guidelines for the distribution planning process;
2. An operating study report showing power flows and voltages for normal and emergency conditions;
3. Listing of critical loads by town; and
4. An analysis of the cost/benefits to using three-phase load flow software.

III. CONCLUSION

While there is no recent indication of repeated major failures in Fitchburg's distribution system, the Department directs Fitchburg to take further action with regard to the several areas described above. First, with respect to growth forecasting, Fitchburg should adjust its forecasting process to include several variables, including the effects of extreme weather, peak load shaving, DSM programs and system losses. Second, with respect to staffing, Fitchburg should address staff levels needed in the forecasting, distribution planning, system planning, distribution engineering and planning departments. Third, with respect to communications,

maintenance, inspection, and distribution design, Fitchburg should address the information gaps specified by the Department in this Order. To ensure that Fitchburg completes its planned improvements to its distribution system and that Fitchburg performs directives in accordance with these, Fitchburg shall make the following annual reports, as well as quarterly reports for the next two years beginning June 1, 2002:

1. Annual Reports Commencing January 1, 2003
Ten-year peak demand load forecasts; planning criteria and guidelines for the entire distribution system planning process; an operating study report showing power flows and voltages for normal and emergency conditions; listing of critical loads by town; listing of significant reliability improvement and infrastructure improvement projects; prioritization of future projects; and
2. Quarterly or Progress Reports Commencing June 1, 2002 and Concluding June 1, 2004
listing of scheduled work regarding tree trimming and inspections, including pole inspections; schedule of deployment of crew, affiliate crew, external contractors, and mutual assistance.

In addition, on June 1, 2002, Fitchburg shall file with the Department a Summer 2002

Readiness Report, assessing (with supporting documentation) its expected ability to respond adequately this coming summer to a repetition, if there should be one, of the severe weather

conditions experienced in the June-August 2001 period. To the extent any of the filing requirements directed by the Department raise concerns regarding system security, the Company should follow normal procedures for protecting confidential information.

By Order of the Department,

James Connelly, Chairman

W. Robert Keating, Commissioner

Paul B. Vasington, Commissioner

Eugene J. Sullivan, Jr., Commissioner

Deirdre K. Manning, Commissioner